

Claims

What is claimed is:

1. A coating composition comprising crosslinkable and crosslinking components, wherein said crosslinkable component comprises:
 - 5 a copolymer having on an average 2 to 25 crosslinkable groups selected from the group consisting of hydroxyl, acetoacetoxy, carboxyl, primary amine, secondary amine, epoxy and a combination thereof; a weight average molecular weight ranging from about 1000 to 4500; a polydispersity ranging from about 1.05 to 2.5; wherein said copolymer is polymerized from a monomer
 - 10 mixture comprising one or more non-functional acrylate monomers and one or more functional methacrylate monomers provided with said functional groups, and
 - wherein said crosslinking component for said crosslinkable groups is selected from the group consisting of polyisocyanate, polyamine, ketimine,
 - 15 melamine, epoxy, polyacid and a combination thereof.
2. The coating composition of claim 1 wherein when said copolymer has said acetoacetoxy functional groups said crosslinking component is ketimine or polyamine.
3. The coating composition of claim 1 wherein when said copolymer
- 20 has said hydroxyl functional groups said crosslinking component is polyisocyanate.
4. The coating composition of claim 1 wherein when said copolymer has said epoxy functional groups said crosslinking component is polyacid.
5. The coating composition of claim 1 wherein said non-functional
- 25 acrylate monomer is provided with a non-functional group selected from the group consisting of linear C₁ to C₂₀ alkyl, branched C₃ to C₂₀ alkyl, cyclic C₃ to C₂₀ alkyl, bicyclic or polycyclic C₅ to C₂₀ alkyl, aromatic with 2 to 3 rings, phenyl and C₁ to C₂₀ fluorocarbon.
6. The coating composition of claim 1 wherein said copolymer has a
- 30 T_g ranging from about -10°C to 80°C.
7. The coating composition of claim 1 wherein said composition has a VOC ranging from 0.1 kilograms to 0.72 kilograms per liter.

8. The coating composition of claim 1 wherein said polyisocyanate is provided with in the range of 2 to 10 isocyanate functionalities.

9. The coating composition of claim 1 wherein said crosslinkable component further comprises a catalyst selected from the group consisting of a tin compound, tertiary amine, acid catalyst and a combination thereof.

10. The coating composition of claim 1 wherein said composition is a clear coating composition, pigmented composition, metallized coating composition, basecoat composition, monocoat composition or a primer.

11. The coating composition of claim 1 wherein said monomer mixture further comprises acid monomers.

12. The coating composition of claim 1 wherein said copolymer is provided with silane functionalities by post reacting said copolymer having said hydroxyl functionalities with isocyanatopropyl trimethoxy silane.

13. The coating composition of claim 1 wherein said monomer mixture further comprises 0.01% to 10% by weight of functional acrylate monomers.

14. The coating composition of claim 1 wherein said monomer mixture further comprises 0.01% to 10% by weight of non-functional methacrylate monomers.

15. The composition of claim 1 wherein said crosslinkable component further comprises 0.1 weight percent to 95 weight percent based on the total weight of the crosslinkable component of an acrylic polymer, a polyester, reactive oligomer, non-alicyclic oligomer or a combination thereof.

16. The composition of claim 1 wherein said crosslinkable component further comprises 0.1 to 50 weight percent of a dispersed acrylic polymer, the percentage being based on the total weight of the composition solids.

17. The coating composition of claim 1 further comprising an aldimine, polyaspartic ester or a combination thereof.

18. The coating composition of claim 1 wherein said copolymer is produced by free radical polymerization of said monomer mixture at a polymerization temperature ranging from about 120°C to 300°C.

19. The coating composition of claim 18 wherein a ratio of said non-functional acrylate monomers to said functional methacrylate monomers in said mixture ranges from about 90 : 10 :: 10 : 90.

20. The coating composition of claim 18 wherein total amount of said
5 non-functional acrylate monomers and said functional methacrylate monomers in said monomer mixture ranges from about 100 percent to about 60 percent based on the total weight of said monomer mixture.

21. The coating composition of claim 18 wherein said free radical polymerization takes place at a reactor gage pressure ranging from 0.1 to 2.86
10 MPa.

22. A process for producing a coating on a substrate, said process comprises:

a) mixing a crosslinkable and crosslinking components of a coating composition to form a potmix, wherein said crosslinkable component comprises:
15 a copolymer having on an average 2 to 25 crosslinkable groups selected from the group consisting of hydroxyl, acetoacetoxy, carboxyl, primary amine, secondary amine, epoxy and a combination thereof; a weight average molecular weight ranging from about 1000 to 4500; a polydispersity ranging from about 1.05 to 2.5; wherein said copolymer is polymerized from a monomer
20 mixture comprising one or more non-functional acrylate monomers and one or more functional methacrylate monomers provided with said functional groups, and

wherein said crosslinking component for said crosslinkable groups is selected from the group consisting of polyisocyanate, polyamine, ketimine,
25 melamine, epoxy, polyacid and a combination thereof;

b) applying a layer of said potmix on said substrate;

c) curing said layer into said coating on said substrate.

23. The process of claim 22 further comprising air drying said layer after said application step.

30 24. The process of claim 22 or 23 wherein said curing step at temperatures ranging from ambient to 204°C.

25. The process of claim 22 wherein said substrate is an automotive body.

26. A coating composition comprising crosslinkable and crosslinking components, wherein said crosslinkable component comprises:

a copolymer having on an average 2 to 25 crosslinkable groups selected from the group consisting of hydroxyl, acetoacetoxy, primary amine, secondary amine, and a combination thereof; a weight average molecular weight ranging from about 1000 to 4500; a polydispersity ranging from about 1.05 to 2.5; wherein said copolymer is polymerized from a monomer mixture comprising one or more non-functional acrylate monomers and one or more functional methacrylate monomers provided with said functional groups, and

wherein said crosslinking component for said crosslinkable groups is selected from the group consisting of polyisocyanate, ketimine, melamine, and a combination thereof.